

### Trend Study 25A-20-04

Study site name: Row of Pines - Total Exclosure .

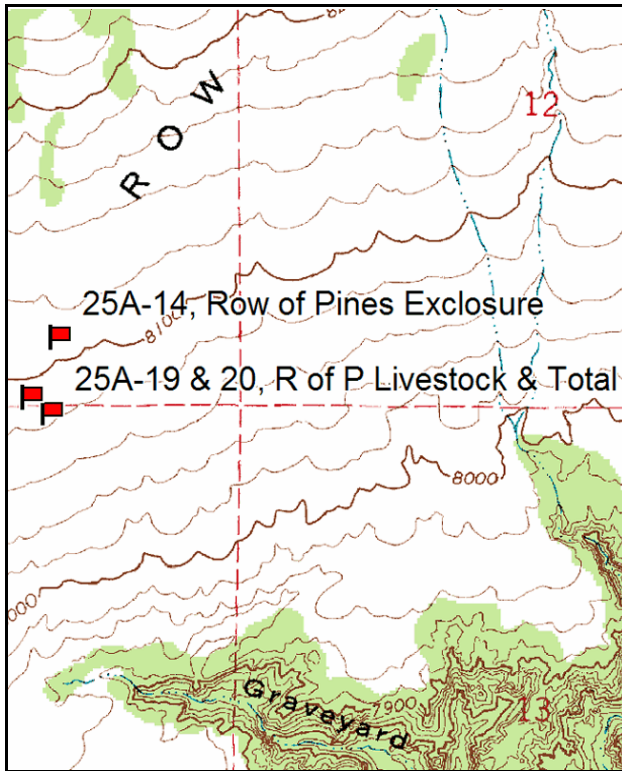
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 205 degrees magnetic.

Frequency belt placement: line 1(11 and 95 ft), line 2(34 ft), line 3(59 ft), line 4(71ft).

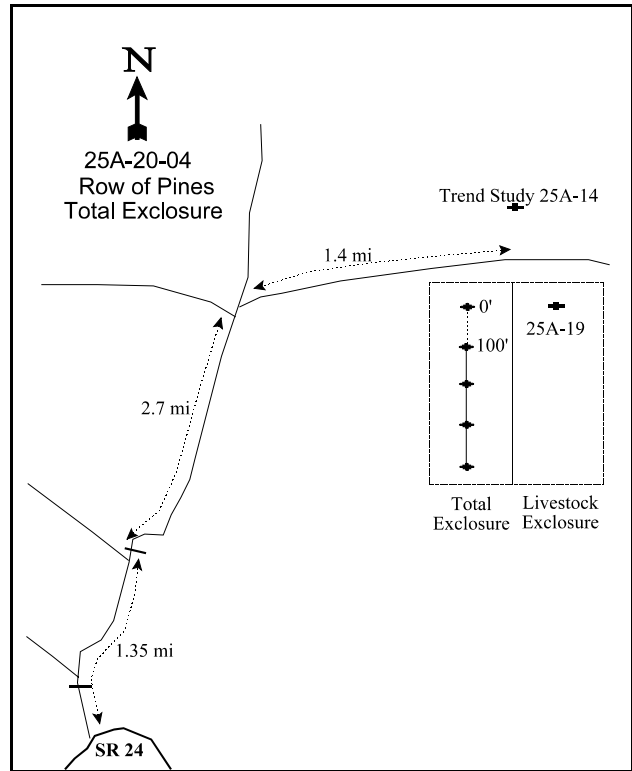
### LOCATION DESCRIPTION

From the Chappell Cheese Factory northwest of Loa on SR 24, go west 2.6 miles to a side road on the north where the highway makes a sharp turn (0.95 miles west of mile marker #49). Take this road 0.65 miles and turn right after crossing a cattleguard. After 0.7 more miles, turn right at the fork and cross another cattleguard. Go 2.7 miles to another fork where you will again turn right. After ~60', turn right (east) and go 1.4 miles to an exclosure. The baseline runs down through the middle of the total exclosure (west side), with the 0 ft stake having browse tag #410 attached.



Map name: Loa, Utah

Township 27S, Range 2E, Section 14.



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4257887 N, 442656 E

## DISCUSSION

### Row of Pines Total Exclosure - Trend Study No. 25A-20

The Row of Pines Total Exclosure trend study was established in 1999. The exclosure was built in the late 1980's after the area was chained and seeded. The total exclosure excludes wildlife and livestock from grazing. Trend study 25A-14 was established in 1991 about 200 feet to the north of the exclosure. During the 1999 reading of this study site, it was determined that data was needed within both the livestock exclosure and the total exclosure. The area supports a sagebrush grass type which is nearly level (3-5% slope) and has a slight south aspect. The general area is used by deer and elk in the winter and early spring, and by cattle in the spring and summer. One old cattle pat was encountered in 1999 within the total exclosure but the fences appeared to be in good repair.

Soil conditions in the total exclosure are nearly identical to that of the livestock exclosure and outside. Soil depth is moderately shallow with an estimated effective rooting depth of just over 11 inches. Texture is a sandy clay loam to a loam with a neutral pH (7.0). Soil parent material is basalt. Phosphorus is marginal at 8.5 ppm. Values less than 10 ppm may limit normal plant growth and development. The soil surface is mostly a combination of pavement and bare ground with some evidence of soil erosion. Vegetation cover is moderate at 28% and litter cover is low at just 11%. However, due to the lack of slope, water erosion is not a major problem in this area.

The key browse species is Wyoming big sagebrush. Density was 6,160 plants/acre in 1999, which was slightly more than the in the livestock exclosure and outside the exclosure. In 2004, density increased 16% to 7,340 plants/acre. Decadency was 27% in 1999, but increased to 52% in 2004. The percent of plants classified as dying increased from 18% in 1999 to 32% in 2004. Seedlings have been rare and young plants have made up 5% of the population in both 1999 and 2004. Since the sagebrush is not utilized within the total exclosure, this decadence would be caused by drought or winter injury, or a combination of both. Density of the increaser, thinleaf low rabbitbrush is similar to the livestock exclosure at about 900 plants/acre. Broom snakeweed density was over two-times higher than the livestock exclosure at 6,320 plants/acre in 1999, but declined 90% to about the same density (620 plants/acre) of the livestock exclosure (540 plants/acre) in 2004.

The total exclosure supports a similar perennial grass understory as the livestock exclosure. Crested wheatgrass and Russian wildrye are the most abundant seeded species. Blue grama is the most abundant native grass, but not as abundant as it is in the livestock exclosure. Crested wheatgrass and bottlebrush squirreltail declined significantly inside both enclosures and outside the exclosure due to drought conditions. Russian wildrye nested frequency increased significantly and cover increased from 2.5% to 5.4%. There was no increase for Russian wildrye outside the exclosure or in the livestock exclosure. Forbs are rare and less diverse in the total exclosure. Low fleabane is the most abundant forb, but declined significantly in 2004.

### 1999 APPARENT TREND ASSESSMENT

Soil conditions are very similar to the livestock exclosure and outside of the exclosure. Vegetation and litter cover are low and most of the protective ground cover comes from rock and pavement. Erosion is minimal due to the armored nature of the soil surface. The browse trend appears to be declining, similar to the livestock exclosure. There is no use here but recruitment is still low, vigor poor, percent decadence moderate, and a large proportion of the decadent plants appear to be dying. Another negative aspect is the large population of the increaser, broom snakeweed, which is more abundant here compared to the livestock exclosure. The herbaceous understory is similar to the livestock exclosure but grasses produce slightly less cover. Forbs are rare with low fleabane being the most abundant with nearly 1% cover.

winter range condition (DC Index) - 50 (good) Wyoming big sagebrush type

## 2004 TREND ASSESSMENT

The trend for soil is similar to the livestock enclosure and is slightly down. Relative bare ground cover decreased from 20% to 15%, but pavement increased from 31% to 36% and rock increased from 9% to 14% indicating a possible loss of soil. Relative vegetation cover decreased from 28% to 20%. The browse trend for the key species, Wyoming big sagebrush, is slightly down. Although density increased 20% to 7,400 plants/acre, decadency nearly doubled from 27% to 52%. The percent of the population that was classified as dying increased from 18% in 1999 to 32% in 2004. Drought conditions 4 of the past 5 years are probably to blame for the downward trend in vigor for this sagebrush population. If drought conditions persist it would be expected that density will decline. The density of broom snakeweed declined 90% which is positive. The trend for the herbaceous understory is down. The two most abundant species in 1999, bottlebrush squirreltail and crested wheatgrass, declined significantly in nested frequency. This was also seen outside the enclosure and in the livestock enclosure. The overall sum of nested frequency for perennial grasses declined 32% since 1999. Protection from grazing has benefitted Russian wildrye, which increased significantly in nested frequency and doubled in cover. Forbs also have declined and are very rare.

### TREND ASSESSMENT

soil - down slightly (2)

browse - down slightly (2)

herbaceous understory - down (1)

winter range condition (DC Index) - 39 (fair) Wyoming big sagebrush type

### HERBACEOUS TRENDS --

Management unit 25A, Study no: 20

Type	Species	Nested Frequency		Average Cover %	
		'99	'04	'99	'04
G	Agropyron cristatum	<sub>b</sub> 99	<sub>a</sub> 58	2.69	1.43
G	Agropyron intermedium	2	-	.00	-
G	Bouteloua gracilis	49	50	1.08	1.02
G	Bromus inermis	4	-	.05	-
G	Elymus junceus	<sub>a</sub> 63	<sub>b</sub> 110	2.51	5.40
G	Oryzopsis hymenoides	18	24	.62	.51
G	Sitanion hystrix	<sub>b</sub> 125	<sub>a</sub> 3	2.01	.01
Total for Annual Grasses		0	0	0	0
Total for Perennial Grasses		360	245	8.99	8.38
Total for Grasses		360	245	8.99	8.38
F	Androsace septentrionalis (a)	5	-	.01	-
F	Astragalus spp.	-	2	-	.01
F	Castilleja spp.	3	-	.00	-
F	Chenopodium leptophyllum(a)	-	2	-	.03
F	Erigeron pumilus	<sub>b</sub> 54	<sub>a</sub> 12	.92	.07
F	Phlox longifolia	-	3	-	.00
F	Sphaeralcea coccinea	10	12	.02	.10

T y p e	Species	Nested Frequency		Average Cover %	
		'99	'04	'99	'04
	Total for Annual Forbs	5	2	0.00	0.03
	Total for Perennial Forbs	67	29	0.94	0.19
	Total for Forbs	72	31	0.95	0.22

Values with different subscript letters are significantly different at alpha = 0.10

#### BROWSE TRENDS --

Management unit 25A, Study no: 20

T y p e	Species	Strip Frequency		Average Cover %	
		'99	'04	'99	'04
B	Artemisia tridentata wyomingensis	91	93	13.97	13.35
B	Chrysothamnus viscidiflorus stenophyllus	25	27	.25	.45
B	Gutierrezia sarothrae	85	26	3.00	.10
B	Opuntia fragilis	2	5	-	.03
	Total for Browse	203	151	17.23	13.94

#### CANOPY COVER, LINE INTERCEPT --

Management unit 25A, Study no: 20

Species	Percent Cover  '04
Artemisia tridentata wyomingensis	12.58
Chrysothamnus viscidiflorus stenophyllus	.20
Gutierrezia sarothrae	.18

#### KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 25A, Study no: 20

Species	Average leader growth (in)  '04
Artemisia tridentata wyomingensis	1.0

BASIC COVER --

Management unit 25A, Study no: 20

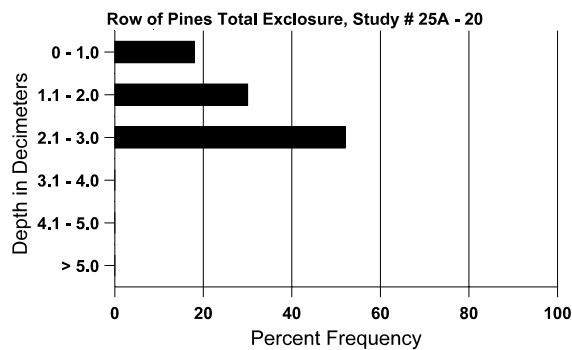
Cover Type	Average Cover %	
	'99	'04
Vegetation	28.20	22.57
Rock	9.11	15.25
Pavement	31.69	40.29
Litter	10.99	18.40
Cryptogams	0	.06
Bare Ground	20.04	16.37

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 20, Study Name: Row of Pines Total Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
11.1	58.3 (9.6)	7.0	47.3	27.4	25.3	1.6	8.5	163.2	0.6

## Stoniness Index



PELLET GROUP DATA --

Management unit 25A, Study no: 20

Type	Quadrat Frequency		Days use per acre (ha)	
	'99	'04	'99	'04
Cattle	1	-	-	-

BROWSE CHARACTERISTICS --  
Management unit 25A, Study no: 20

		Age class distribution (plants per acre)					Utilization					
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
99	<b>6160</b>	-	320	4180	1660	620	0	0	27	18	19	11/21
04	<b>6300</b>	20	360	2120	3820	1320	0	0	61	37	37	10/19
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
99	<b>900</b>	-	-	740	160	-	0	0	18	18	20	4/7
04	<b>880</b>	-	20	580	280	160	0	0	32	9	9	5/9
<i>Gutierrezia sarothrae</i>												
99	<b>6320</b>	-	240	6040	40	260	0	0	1	.63	2	7/9
04	<b>620</b>	-	80	520	20	-	0	0	3	-	0	5/7
<i>Opuntia fragilis</i>												
99	<b>40</b>	-	20	20	-	-	0	0	-	-	0	-/-
04	<b>100</b>	-	-	100	-	-	0	0	-	-	0	2/9

## ROW OF PINES EXCLOSURE COMPARISON SUMMARY 25A-14, 19, & 20

Ground cover characteristics are similar between sites in that vegetation and litter cover are low and most of the ground cover is made up of rock and pavement. Vegetation cover has declined for all three studies, while the total enclosure has the most vegetation cover. Litter cover was similar for each study in 2004. Rock and pavement cover increased inside each enclosure, which may indicate soil loss, while bare ground increased outside the enclosure. Due to the study sites close proximity, soil conditions are nearly identical. The soil is moderately shallow with effective rooting depths at just over 11 inches. Soil texture is a sandy clay loam to a loam with an identical neutral pH (7.0). Soil temperatures were about equal for each site at about 58°F for each treatment in 2004. There is minimal soil movement occurring but the armored nature of the soil surface limits erosion.

Wyoming big sagebrush (see table below) densities were similar in 1999, ranging from 5,580 plants/acre outside to 5,820 plants/acre in the livestock enclosure, and 6,160 in the total enclosure. In 2004, density outside the enclosure and inside the livestock enclosure declined by about 15% for each, however inside the total enclosure density increased by 20%. Decadence increased for each study from about 27% in 1999 to 42% outside, 69% in the livestock enclosure, and 52% in the total enclosure in 2004. The percent of dying plants also increased for each study. Utilization is moderate outside of the enclosure and much heavier in the livestock enclosure. Outside the enclosure, deer use increased from 29 days use/acre (72 ddu/ha) in 1999 to 76 days use/acre (190 ddu/ha) in 2004. In the livestock enclosure, deer use increased from 48 days use/acre (118 ddu/ha) to 126 days use/acre (312 ddu/ha). Elk and cattle use has been low. Seed production and recruitment is poor on all sites and young plants are not abundant enough to maintain the current populations. The combination of drought 4 of the past 5 years in addition to increased utilization outside the enclosure and inside the livestock enclosure appear to have caused the decline of this sagebrush population. Inside the total enclosure, where plants receive no browsing, sagebrush vigor has declined, but density actually increased. Continued drought may prove to be detrimental as 32% of the population appears to be dying.

	Outside Enclosure 25A-14		Livestock Enclosure 25A-19		Total Enclosure 25A-20	
	1999	2004	1999	2004	1999	2004
Cover	13.11	11.14	8.23	5.31	13.97	13.35
Density (Plants/acre)	5580	4780	5820	4900	6160	7340
% young (Plants/acre)	6 (340)	2 (80)	3 (160)	2 (100)	5 (320)	5 (360)
% mature (Plants/acre)	65 (3620)	56 (2700)	70 (4100)	29 (1440)	68 (4180)	44 (3200)
% decadent (Plants/acre)	29 (1620)	42 (2000)	27 (1560)	69 (3360)	27 (1660)	52 (3820)
% dying (Plants/acre)	14 (760)	19 (900)	17 (980)	34 (1680)	18 (1080)	31 (2320)
% heavy use	17	22	46	60	0	0
Average height/crown	13/24	13/25	12/23	10/20	11/21	10/19

Density of the increaser, thinleaf low rabbitbrush, is similar between sites at about 900 plants/acre. Another increaser, broom snakeweed, was extremely abundant outside of the enclosure at 10,000 plants/acre in 1999, but density decreased 86% to 1,420 in 2004. Density also decreased for both enclosure transects to about 600 plants/acre in each enclosure.

The herbaceous understories are similar on all sites in composition, but abundance differs. Outside of the enclosure, the warm season species blue grama dominates the grass composition by providing 85% of the grass cover. This indicates heavy spring grazing. Inside the enclosures composition is similar, but no single species dominates. Crested wheatgrass and bottlebrush squirreltail each declined significantly in nested frequency in 2004 for all three studies, which indicates the effects of drought. With the absence of grazing in the total enclosure, Russian wildrye increased significantly. Forbs are rare and declined for each study in 2004.